CHAPTER

6

SERVER CONFIGURATION

After reading this chapter and completing the exercises you will be able to:

- Explain how to use the tools in the Control Panel
- Install and configure the display, pointing devices, keyboard, computer hardware, recovery options, protocols, and additional Windows 2000 Server components
- Use the Device Manager to view hardware properties and troubleshoot problems

Successfully installing Windows 2000 Server provides an important foundation on which to build and customize a server for your organization. The next phase in the process is to customize Windows 2000 Server, using the tools that are now installed and ready to use. There are hundreds of ways to customize your server to match specific hardware and software needs. You might start with small steps, configuring a screen saver or new trackball, for example, and move on to more ambitious configuration tasks that include installing more disk storage and configuring additional protocols. If the server is destined for Internet and intranet services, then one of your configuration steps will involve installing the Internet Information Services component, which is updated from the one included with Windows NT 4.0.

You start with small steps in this chapter by learning Control Panel options that include setting up display and pointing devices and configuring protocols and other network options. You learn about tools that can help make server configuration easy, such as the Add/Remove Hardware Wizard and the Network and Dial-up Connections tool. Configuration tasks that may at first sound daunting are greatly simplified by the tools included in Windows 2000.

Setting Up the Server Environment

Windows 2000 Server offers one place for you to get an immediate start in configuring the server, the Control Panel. Because you may need to immediately set up the server for a particular monitor, pointing device, or keyboard, the Control Panel is often the first place to start configuring. The Control Panel is similar to a control center where you can customize Windows 2000 Server for devices, network connectivity, dial-up capabilities, and many other functions. In the sections that follow, you gain an overview of the Control Panel tools and next you learn how to use them. Plan to thoroughly learn the Control Panel options because they are vital to the role of a server administrator.

Control Panel Overview

The Control Panel is accessed by clicking the Start button, highlighting the Settings option, and then clicking Control Panel. Two other ways to access the Control Panel are from My Computer on the Windows 2000 desktop and from the My Computer option in Windows Explorer. Each tool in the Control Panel is represented by an icon or folder. To customize the display, click the View menu, which has options similar to the ones in Windows Explorer. From the View menu, you can customize the toolbars and Explorer bars, the size of the icons, the display of details, and the arrangement of icons. For example, some users like to activate the Standard Buttons and Address Bar for fast access to utilities. Figure 6-1 illustrates the Control Panel with both of these options enabled by placing checks in front of each one.

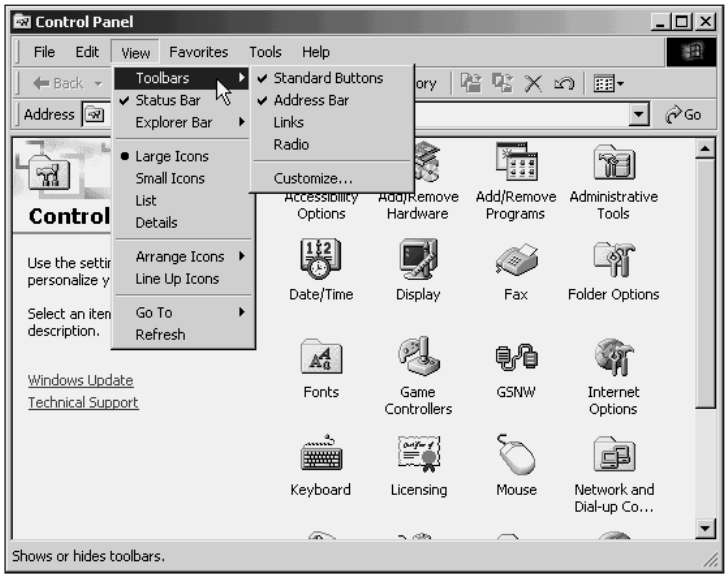

Figure 6-1 Control Panel toolbars

The content and purpose of the Control Panel is changed in Windows 2000 as compared to Windows NT because the focus in Windows 2000 is on server configuration, instead of on combined management and configuration tools. For example, the management of server services and logged on users is part of the Computer Management snap-in in Windows 2000 and not part of the Control Panel as in Windows NT. Some of the icons that appear in the Windows 2000 Control Panel are determined by what applications you have installed, particularly third-party applications that use the Control Panel for configuration.

The sections that follow provide summaries of the Control Panel tools that are typically installed when you install Windows 2000.

Accessibility Options

The Accessibility Options tool enables a computer to accommodate the particular visual, audio, and sensory needs of the user. Keyboard and mouse button options can be used to set up the workstation for easier access. Special SerialKey devices can be installed to provide alternatives to keyboard and mouse use. Table 6-1 lists the options and their purpose.

Table 6-1 Accessibility Options

Accessibility Option	Purpose
Display	Enables the display to be set to use colors and contrast for easier viewing
General	Sets alternative keyboard and mouse access features and provides notification when an accessibility feature is turned off
Keyboard	Provides alternate touch and sound options for keyboard functions
Mouse	Enables the keyboard keypad to act as a pointing device
Sound	Displays visual warnings and captions for sounds

Add/Remove Hardware

Hardware installation and troubleshooting is made easier by clicking this icon to start the Add/Remove Hardware Wizard. Use the icon when you add a new SCSI adapter or install a second NIC, for example. Because Windows 2000 Server supports Plug and Play (PnP), the wizard can detect the device and automatically configure the IRQ and I/O settings.

You can also use the wizard to troubleshoot a problem with a device or to uninstall or unplug a device (see Figure 6-2). For example, you might uninstall a NIC before you replace it with another one, or temporarily unplug a PCMCIA card before removing it from the computer.

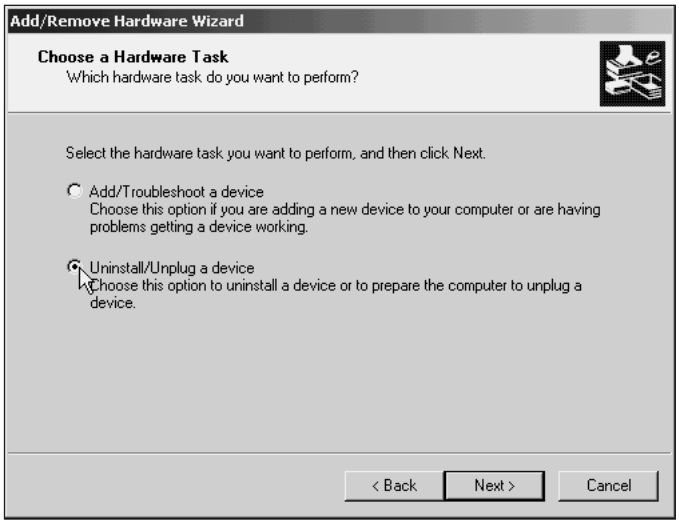

Figure 6-2 Add/Remove Hardware Wizard

Add/Remove Programs

Software applications are installed and uninstalled using the Add/Remove Programs tool. For example, click the Add/Remove Windows Components option after starting the tool, to install an application that was not installed at the time of the Windows 2000 Server setup. The components that you can install are listed in Table 6-2. Also, you can install any new software, such as Microsoft Office, by clicking the Add New Programs option or remove an installed application by clicking Change or Remove Programs.

Pre-Windows software or "legacy" MS-DOS software cannot be loaded with the Add/Remove Programs tool. To load legacy software, use the Run option from the Start menu.

Table 6-2 Windows Components

Component	Description
Accessories and Utilities	Installs components that include a wizard to configure accessibility options, accessories such as Notepad, communications tools, games, and multimedia tools
Certificate Services	Used for certification authority for security through certificates
Indexing Service	Used to quickly search file contents for specific words or strings of words
Internet Information Services (IIS)	Installs Internet Information Services for a Web site and for FTP-based file transfers through TCP/IP

Table 6-2 Windows Components (continued)

Component	Description
Management and Monitoring Tools	Used to manage and monitor the server and the network
Message Queuing Services	Services for network-based messaging
Networking Services	Installs protocols for specialized services that include DNS, QoS, DHCP, and other services
Other Network File and Print Services	Enables print services for UNIX and Macintosh computers
Remote Installation Services	Enables the installation of Windows 2000 Professional on remote computers that can be booted remotely
Remote Storage	Used to enable Windows 2000 to write files to remote devices, such as tape drives
Script Debugger	Enables debugging of ActiveX script tools, VB script for example
Terminal Services	Enables clients to run programs located on the server, as though they were terminals
Terminal Services Licensing	Controls licensing for terminal services
Windows Media Services	Used to "stream" multimedia from the server to the clients, so that an audio/video file starts playing before it is fully received

Administrative Tools

This folder is added to the Control Panel as a convenience to quickly access shortcuts to administrative tools, such as the Computer Management tool or the Internet Services Manager tool. One reason for having an Administrative Tools folder in the Control Panel is that NT Server 4.0 users may be used to open the Control Panel to access management tools. The other way to access these tools is by clicking Start, pointing to Programs, and pointing to Administrative Tools.

Date/Time

With the Date/Time tool, you can set the calendar date, time, and time zone. This is an important tool for date-stamping files to track software versions, updates to financial information, and logon and access history data on a server or a workstation. Documents, files, and other important information are permanently imprinted with a **date stamp** to record their creation date and time and to record modification dates and times.

Display

The Display tool is used to set video characteristics, including the desktop background, display colors and resolution, the appearance of the title bar, screen-saver parameters, and other options.

There also are settings to help accommodate a user's visual impairments. Table 6-3 lists the Display options.

Table 6-3 Display Options

Display Option	Purpose
Appearance	Sets the appearance of desktop entities such as title bars, application background, window borders, and icons
Background	Sets the display pattern and wallpaper
Effects	Sets visual parameters for icons and which icons to associate with desktop functions
Screen Saver	Sets up a screen saver, controls screen saver parameters, and controls the energy-saving features of your display (if the display is energy-saver-compatible)
Settings	Sets up the color palette and pixel desktop area and is used to troubleshoot problems with display settings
Web	Sets the properties of Web page displays

Fax

When you have fax-capable hardware installed, Windows 2000 provides built-in fax services that you can configure from the Control Panel. There are options to configure user information, including the fax user's name, the fax telephone number, user e-mail address, and other descriptive information. You can also set up a cover page for the entire organization or cover pages for specific individuals or departments. Fax monitoring preferences are configured that include how you are notified when a fax is received.

Folder Options

In previous versions of Windows, you customize folder options from My Computer or Windows Explorer. In Windows 2000 you can customize folder options from the Control Panel as well as from My Computer and Windows Explorer. The folder options enable you to customize the desktop, customize how you browse folders, customize how files are viewed, associate file types with programs, and determine if files set up for network access can be used when you are not logged on to the network. For example, the Folder Options icon enables you to set the desktop to allow you to browse folders by using the same interface as is used for Internet Explorer, or you can use the classic Windows desktop interface. You can also set Windows 2000 to automatically start a program, such as Notepad when you open a file that has a specific extension, for example, starting Notepad when you open files with a .txt extension, such as Netlog.txt. There are four tabs full of options that you can set: General, View, File Types, and Offline Files (see Figure 6-3). Table 6-4 summarizes the options.

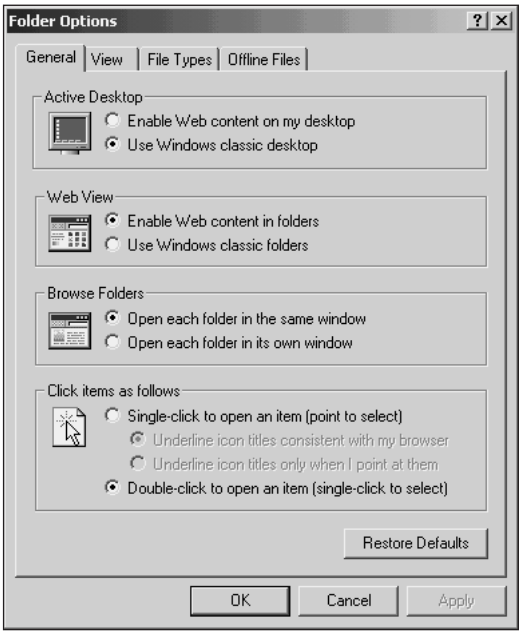

Figure 6-3 Folder Options dialog box

Table 6-4 Folder Options

Folder Option	Purpose
General	Sets up the active desktop and Web views, customizes how folders are opened, and determines if items are opened through a single or double click
View	Determines how files and folders are viewed, such as whether hidden files and folders are displayed and if certain file extensions are displayed
File Types	Enables you to associate a file type, such as an HTTP file (.htp), with a program that runs when you open the file, Internet Explorer for example
Offline Files	Enables you to set up network files shared by other computers so that you can access them offline by storing the files on the server and synchronizing the files between the server and network before logging off

Fonts

Windows 2000 Server supports a huge number of fonts and point sizes, and software vendors offer additional fonts for Windows. Fonts are installed or removed with the Fonts tool. Installed fonts are contained in the \Winnt\Fonts folder.

Game Controllers

This Control Panel option is included primarily for parallel development with Windows 2000 Professional, because you are not likely to attach a game controller to a server. Game controllers in Windows 2000 are connected either to a USB port, to a serial port, or as a card in an expansion slot. If the controller is connected to a USB port, Windows 2000 automatically detects it, as long as the computer is turned on when the controller is installed. If the controller is connected to a serial port or in an expansion slot, then you can configure the controller by using the Game Controllers icon in Control Panel.

GSNW

The GSNW (Gateway Service for NetWare) icon is used to configure Windows 2000 Server to act as a gateway for one or more NetWare file servers. Users running Windows 3.11, Windows 95, Windows 98, Windows NT, and Windows 2000 can access NetWare folders and files as a Windows 2000 Server shared folder instead of logging on to a NetWare server. This tool provides a way to manage the gateway services, which must first be installed, started, and running before they are available to clients.

Internet Options

The Internet Options icon is used to customize Internet access to the server. The properties that you can set up include the location of the home page to access first, the location of temporary Internet files, security parameters, content and certificate management, dial-up connectivity, programs for e-mail access, and advanced options. The advanced options are for browsing, Java access, multimedia access, printing, and security. Windows 2000 offers a wide range of Internet security parameters.

Keyboard

With the Keyboard tool, you can customize the keyboard setup for key repeat rate, cursor blink rate, language, and keyboard type. Also, you can install a new keyboard driver by using this tool.

Licensing

After you install Windows 2000 Server, you may decide to purchase additional licenses to match the growth in network use. The Licensing tool enables you to add new licenses and to remove licenses. It also lets you change the licensing mode from per server to per seat, or vice versa.

Mouse

With the Mouse tool, left-handed users, those who want a different scheme of mouse pointer symbols, and those who want to slow down the mouse response can customize the mouse. The tool is used to install or upgrade a mouse driver, if you change from a mouse to a trackball for example.

Network and Dial-up Connections

The connectivity features in previous Windows versions are united into the Network and Dial-up Connections folder, which can be accessed from the Control Panel and from the Start button Settings menu. This tool is used any time you need to create a new connection to a network, to another computer, to a WAN, or to a dial-up network. There is a Network Connection Wizard that steps you through setting up a new connection. Also, the tool enables you to change the parameters for an existing connection, such as adding a new protocol to connect to the network. Another option is to load network services using the Network and Dial-up Connections tool.

An important new feature in Windows 2000 is the ability to disable a network connection via the Network and Dial-up Connections folder (see Figure 6-4). Use this feature when you need to take the server offline for maintenance, such as when you make changes to protocols or install a new driver.

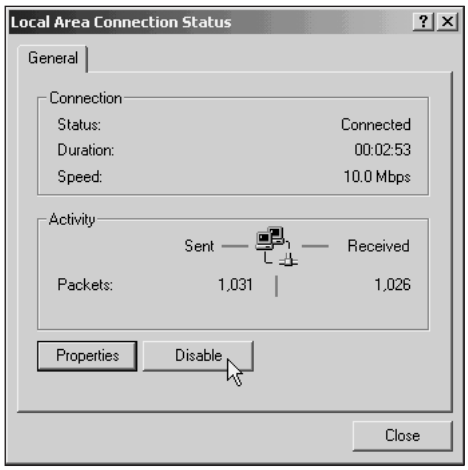

Figure 6-4 Disabling the local area network connection

Phone and Modem Options

Modems work using telecommunications lines or cable TV lines, and modems connected to telecommunications lines may have voice and telephone capabilities. The Phone & Modem Options tool enables you to configure a modem for data and voice communication. You can use the tool to upgrade a current modem driver or to start the Add/Remove Hardware Wizard when you add a new modem.

You use the Phone and Modem tool to check that installed modems are set to their maximum speed and that communications parameters, such as data bits, parity, and stop bits, are set correctly. Usually data bits are set to 8, parity is none, and stop bits equal 1.

Data bits are the number of bits used to represent one character, such as the letter "a." Parity is a method to check for errors, and the stop bit is a character used to indicate that the transmission of a byte of data is complete. Also, by using the Phone and Modem Options tool you can set up the data protocol and compression used in modem communications. On voice- and fax-capable modems, you can set up parameters, such as different ring sequences, for data only, voice, or fax calls, as they are received.

Power Options

Because Windows 2000 supports power management, it enables you to configure these options through the Power Options icon in the Control Panel. For example, you can set management options to turn off the monitor or hard disks after a specified period that they have not been in use. Another option is to have the computer automatically shut down when the off button is pressed. Also, the computer can be set to go into "hibernation" when it is not in use, automatically saving to disk what is in memory.

Some server administrators only use power management to turn off the monitor, or they do not use any power management, depending how a server is being used.

Printers

This is the same Printers folder that can be accessed from the Start button Settings option. It contains the Add Printer Wizard for installing a new printer, plus controls for managing one already set up. (Printer management is covered in Chapter 11.)

Regional Options

Users who prefer to view time in 24-hour notation use this tool to customize the display. The Regional Options tool also enables international customization of numbers, the date and time formats, currency, and language. For the new millenium, there is an option to interpret a two-digit year format to a four-digit format.

Scanners and Cameras

Windows 2000 supports the attachment of scanners and cameras. If you install a scanner card or attach a digital camera, use the Scanners and Cameras icon to install and set up the drivers for these devices.

Scheduled Tasks

In Windows NT there is an AT command available through the Command Prompt window that enables you to run a specific task, command, or script at a specified time. Windows 2000 adds the Scheduled Tasks folder so that you have more flexibility in scheduling tasks from a GUI environment. The addition of the folder enables you to run the Scheduled Task Wizard,

which offers a list of programs to schedule, such as Disk Cleanup or Synchronize (for DCs). You can run the task one time only or at regular intervals, such as once a day or once a week at a specified time. For example, you might run Synchronize each evening before starting to back up all servers on a network. Also, you can specify that a task be run from a specific account that has permissions to execute that task.

When you create a scheduled task, a file is created in \Winnt\Tasks that works in conjunction with the AT scheduling command and the Task Scheduler service. The advantages of this addition to Windows 2000 are that scheduled tasks are easier to set up, and they can be ported to any Windows 2000 server by copying the appropriate file.

Use the Computer Management tool to make sure that the Task Scheduler service is set to start automatically before you set up scheduled tasks.

Sounds and Multimedia

Special sound effects are provided with Windows 2000 Server, such as musical chords, dinging bells, "tada!," and others. New sounds can be purchased and added. The Sounds tool enables the server administrator to associate a sound with a specific event, such as receiving a new mail message or shutting down the computer. Of course, to use sounds, the computer needs a sound card and speakers.

Windows 2000 Server supports a wide range of audio, music, and speech capabilities, including multimedia compression, MIDI, and other devices. These devices, including drivers, are added and removed through the Sounds and Multimedia tool. The tool also has playback and recording controls.

System

The server environment and performance are managed from the System tool (see Figure 6-5). Windows 2000 Server has advanced capabilities to set up hardware and user profiles, which is useful when the server functions as a means to provide a common desktop to some or all server users. Desktop settings can be customized so users see the same desktop no matter which computer they use to log on to the server. Also, different hardware profiles can be set up to match changing situations, such as when the server sometimes uses a remote monitor and keyboard and sometimes uses its own monitor and keyboard. Remote setups are used in machine rooms in which there are 10, 20, or more servers, all connected through a switch box to be accessed from a single monitor and keyboard. You can also use the System tool to change the name of the computer or the domain, and to tune the server for better performance.

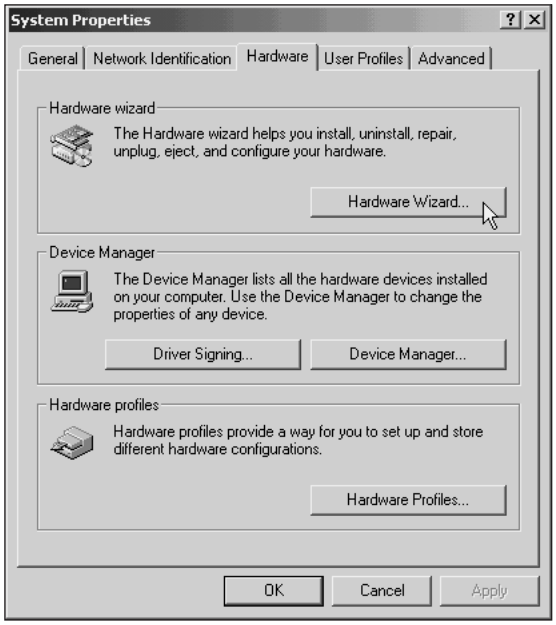

Figure 6-5 System options

CONFIGURING THE SERVER ENVIRONMENT

The immediate configuration tasks involving Control Panel icons often include configuring the display, a pointing device, a keyboard, and startup and power management parameters; installing hardware; configuring protocols; and installing additional software components. The sections that follow describe how to install and configure all of these. However, before discussing the installation of new hardware or how to configure a protocol, it is important to introduce a new feature in Windows 2000 called driver signing.

Configuring Driver Signing

When you install a device such as a pointing device or a NIC, you have the option to make sure that the driver for that device has been verified by Microsoft. When a driver is verified by Microsoft, a unique digital signature is incorporated into that driver, in a process called **driver signing**. When you set up Windows 2000 Server you can choose to be warned that a driver is not signed, to ignore whether or not a driver is signed, or to have the operating system prevent you from installing a driver that is not signed. To set your preference:

1. Log on as Administrator or with Administrator privileges.
2. Open the System icon in the Control Panel.
3. Click the Hardware tab and click Driver Signing (refer to Figure 6-5).

4. Click one of the three options under File signature verification: Ignore – Install all files, regardless of the file signature, Warn – Display a message before installing an unsigned file, or Block – Prevent installation of unsigned files. (The Warn option is set as the default.)
5. Check or remove the check from the option, Apply setting as system default. If you check this option, this means that Windows 2000 Server will apply signature verification to users who log on to the server and attempt to install any software (which gives you a measure of assurance that a virus will not be introduced and that the software is Windows 2000 compatible).
6. Click OK to save your settings in the Driver Signing Options dialog box.
7. Click OK to exit the System Properties dialog box.

When you configure driver signing, you configure it to apply to all new software installations, as well as device drivers. Each time you install a word processor or spreadsheet application, the drivers used in that application are also verified. If you have selected the Block option, this means that drivers and operating system files cannot be modified or overwritten by files that do not have the appropriate digital signature. No software installation can inadvertently install a driver or system file that is inappropriate for your version of Windows 2000 Server.

If you do not have the Block option set and you copy an inappropriate file over a system or driver file, for example a .dll, .exe, or .sys file, Windows 2000 Server automatically runs the System File Checker when the operating system boots. The System File Checker locates the original system file in the Winnt\system32\dllcache folder and then copies it over the inappropriate file. You also have the option to run the System File Checker from the command prompt to check files without rebooting by using these steps:

1. Click Start, point to Programs, point to Accessories, and then click Command Prompt.
2. Enter sfc /? in the Command Prompt window, to view the switch options you can use to check and replace files.
3. Use either the Start button, Run option or the Command Prompt window to run the scan that is appropriate to your situation, such as *sfc /scannow* to begin scanning all system files and overwrite any inappropriate files that it finds. Keep in mind that it is safest to have users off the system when you check files and you still may need to reboot before a replaced file goes into effect.
4. In some cases, the checker may request that you insert the Windows 2000 Server CD-ROM to obtain a file.
5. The checker displays an information box to show its progress. If it finds a file that needs to be replaced, it prompts you (unless you run the utility in quiet mode).

Windows 2000 Server includes another tool, called Sigverif, that verifies system and critical files to determine if they have a signature. This tool only scans files and does not overwrite inappropriate files, enabling you to use the tool while users are logged on. To use Sigverif, click the Start button, click Run, enter Sigverif in the Run dialog box, and click OK. Click the Advanced button in the first dialog box to set the verification options and then click Start to begin verifying files.

Configuring the Display

One of the first server components that you may need to configure is the display. For example, you might decide to replace the existing monitor with one that is smaller or larger, or to use a specialized monitor, any of which requires installing a new driver. Also, you likely will install a screen saver for the display. A new display driver is installed from the Settings tab after opening the Display tool (see Figure 6-6). Click the Advanced button, the Monitor tab, the Properties button, and the Driver tab. Click Uninstall to remove a driver or click Update Driver to put in another one. You will need a driver disk from the monitor manufacturer, or you can use a driver from the Windows 2000 Server CD-ROM. You can also adjust the color and pixel settings of the screen from the Settings tab in the Display Properties dialog box. For example, if your screen supports 32-bit True Color but is set for 256 Colors, you would click the Colors box, select True Color (32 bit), click Apply, and click OK to have the screen go into a temporary test mode using the new setting. You would click Yes if the test looked good, or click No to go back to the original setting (try Hands-on Project 6-1).

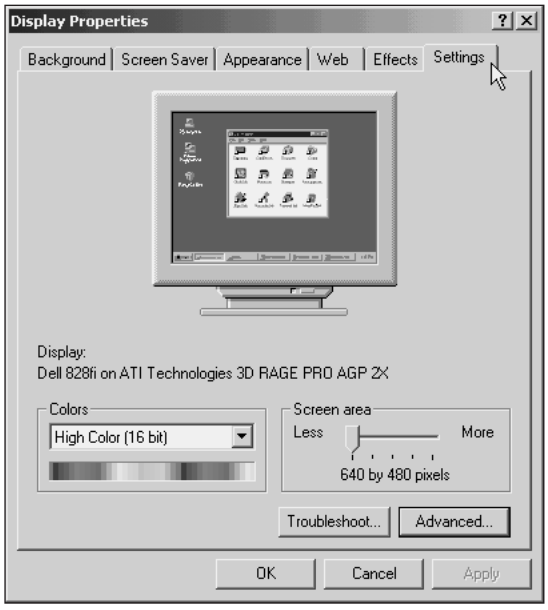

Figure 6-6 Configuring the display

Another way to install or uninstall a driver for any device is to use the Device Manager. Click the System icon in the Control Panel, click the Hardware tab, click the Device Manager button, and double-click the device, such as display adapter. Click the specific device name, such as ATI Technologies Inc. 3D Rage Pro, and click the Driver tab. You can also access the Device Manager from the Computer Management tool.

Installing a screen saver has two important advantages: it extends the life of the display monitor, and it provides security when you step away from the server after logging on. Screen savers are especially important for extending the life of a typical monitor, which functions much like a television screen. The monitor contains a cathode-ray tube with a gun that shoots electrons at a phosphorus-based screen inside the tube. The electrons are fired in patterns to form images on the screen. When the same screen image is displayed continuously for hours, such as on a word-processing screen, the repeated shooting of the electrons to the same areas can "burn" that image into the screen. A screen saver produces constant change on the screen, causing the electron gun to fire at more random screen locations, instead of at the same spot.

Equally important, a screen saver can provide security when you are away from the server, but have not logged off from an account, such as Administrator, which has extensive access to the entire network and its resources. With security enabled, you must enter a password to close the screen saver and return to the work screen. That prevents anyone without the password from accessing the server.

Windows 2000 Server supports **OpenGL**, which is a standard for multidimensional graphics. Several interesting OpenGL-based screen savers are available for Windows 2000, including a few already bundled with the operating system, 3D Flowerbox, 3D Flying Objects, and 3D Pipes, for example. These graphics add a pleasing touch to screen savers.

Choose a screen saver carefully. Some screen savers are CPU-intensive, which means they can slow down user and background processes on a server. This is especially a problem with OpenGL screen savers, including 3D Maze and 3D Pipes. For low system resource use and simplicity, some network administrators use the Logon Screen Saver, which is a moving Windows 2000 box.

To set up a screen saver with a password, double-click the Display icon in the Control Panel and click the Screen Saver tab. Select a screen saver in the Screen Saver box and place a check in the Password protected box, as shown in Figure 6-7. Enter the amount of time that the screen can be inactive before the screen saver is started, such as 10 minutes. Click the Apply button to have the change go into effect immediately and click OK.

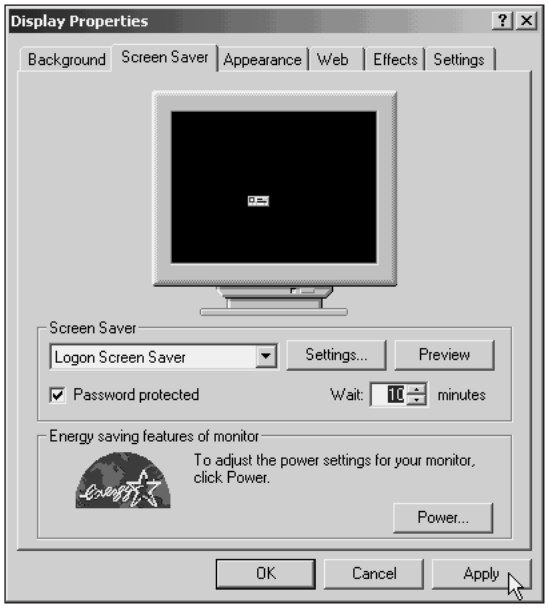

Figure 6-7 Screen saver setup

Configuring the Mouse and Pointing Devices

The Mouse icon in the Control Panel provides a way to customize mouse features and to install a driver for a particular type of pointing device, such as a trackball. The customization options are shown in Table 6-5.

Table 6-5 Mouse Setup Options

Option	Purpose
Buttons	Sets right-handed and left-handed options, single-click and double-click options, plus the double-click speed
Hardware	Sets up a new mouse and driver and hardware resources, such as the IRQ
Motion	Controls the mouse speed and acceleration, and sets the default "snap to" option
Pointers	Customizes the pointer icons displayed with specific functions such as busy or text select

To change the mouse speed, click the Motion tab and adjust the pointer speed bar between slow and fast. If you are installing a new mouse driver, click the Hardware tab, the Properties button, and then the Driver tab (see Figure 6-8). Click Uninstall to remove a driver or click Update driver to update an existing driver or to have the Upgrade Device Driver Wizard detect another pointing device and install the driver. Insert the pointing device manufacturer's disk

containing the driver and click Have Disk to install the driver. Provide the path to the driver disk and click OK.

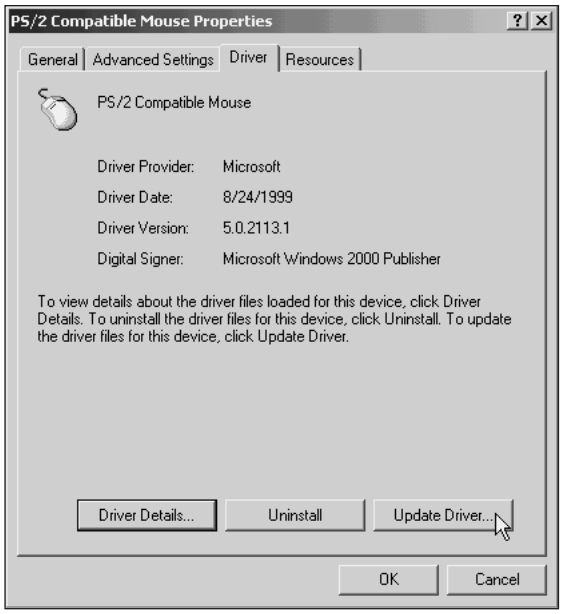

Figure 6-8 Installing a pointing device driver

Configuring the Keyboard

The Keyboard icon in the Control Panel provides a way to change keyboard characteristics or to install a driver for a specialized keyboard. For example, if you find the key repeat rate is too fast, click the Speed tab and move the repeat rate bar to a slower setting. If you are using a specialized keyboard and there is an updated driver for it, click the Hardware tab, the Properties button, and the Driver tab. Click Update Driver to start the Upgrade Device Driver Wizard. Make sure you have the manufacturer's driver disk with the new driver. Table 6-6 summarizes the keyboard configuration options.

Table 6-6 Keyboard Setup Options

Option	Purpose
Hardware	Displays keyboard properties, installs a keyboard driver, and troubleshoots problems
Input Locales	Sets up language and other keyboard properties for locales that use different languages, such as English and Swedish
Speed	Sets up keyboard characteristics such as repeat delay, repeat rate, and cursor blink rate

Adding, Removing, and Testing Hardware

The easiest way to add new hardware is to use the Add/Remove Hardware tool in Control Panel. It is common to add hardware after you have installed Windows 2000 Server, such as a new SCSI adapter, a different monitor adapter, a different keyboard, a tape drive, or a RAID array. The Add/Remove Hardware Wizard can detect the new device as long as you have the Plug and Play service started in advance. When you install a device, make sure you have the most recent copy of the manufacturer's driver for that device, obtaining it via the Internet for instance. For example, if you install a new SCSI adapter card:

1. Turn off the computer and install the card according to the manufacturer's instructions.
2. Turn on and boot the computer, then open the Control Panel and double-click the Add/Remove Hardware icon to start the Add/Remove Hardware Wizard.
3. Click Next.
4. Click Add/Troubleshoot a device.
5. Wait for the wizard to detect and configure the device. Have the manufacturer's device driver available in case you need it for the installation.

If the Add/Remove Hardware Wizard cannot detect the device, check the Plug and Play service by clicking Start, pointing to Programs, pointing to Administrative Tools, and clicking Computer Management (or open Computer Management from the Administrative Tools icon in Control Panel). Click Services and Applications in the left or right pane and double-click Services in the left or right pane. Scroll the right pane until you see Plug and Play, then make sure that the status shows Started (you may need to double-click Plug and Play to view the status). If it does not, double-click Plug and Play, display the General tab, and click Start.

Also, you can use the Add/Remove Hardware Wizard to remove or unplug a device, which you can do from the Choose a Hardware Task dialog box by clicking Uninstall/Unplug a device (try Hands-on Project 6-2). For example, consider a situation in which the original NIC in the server is a 10/100-Mbps NIC and you want to install a 1-Gbps NIC, in order to connect the server directly to a high-speed backbone switch for faster throughput. The general steps you would follow are:

1. Open the Control Panel Network and Dial-up Connections icon, double-click Local Area Connection, click Disable, and close the Network and Dial-up Connections tool.
2. Open the Control Panel Add/Remove Hardware icon, click Next, click Uninstall/Unplug a device (see Figure 6-2), click Next, and click Uninstall a device in the Choose a Removal Task dialog box. Click Next. Select to uninstall the 10/100-Mbps NIC that you want to replace (see Figure 6-9). Click Next and complete the Uninstall steps.

3. Shut down and turn off the computer. Remove the old NIC and install the new one. Turn on the computer to reboot.
4. The Add/Remove Wizard will start when you reboot so that you can configure the new NIC; or you can start the Wizard from the Control Panel. Install and configure the new NIC.
5. Use the Network and Dial-up Connections tool in Control Panel to make sure that the NIC is connected to the network by double-clicking Local Area Connection as you did in Step 1. Also, check the NIC's configuration by clicking Properties in the Local Area Connection Status dialog box, and then click Configure on the General tab. For example, you can configure transmission media type and duplex settings by clicking the Advanced tab (depending on the driver included with your NIC), and you can check for a resource conflict by clicking the Resources tab (resource conflicts are discussed later in this chapter).

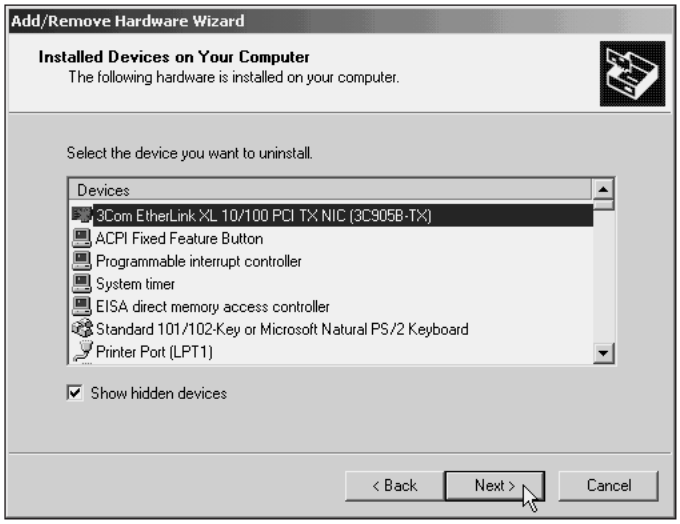

Figure 6-9 Uninstalling a NIC

Because you have just installed the server, you may want to check one or more devices, such as a disk or tape drive, to make certain they are working properly. To check a device, start the Add/Remove Hardware Wizard from the Control Panel, click Next, click Add/Troubleshoot a device, click Next, select the device you want to test, click Next, and view the results. Click Finish to end or click Back to go back and test another device (try Hands-on Project 6-3).

Configuring Startup and Recovery

Windows 2000 Server enables you to configure parameters that govern the startup sequence and how the system recovers from errors. Check theses settings shortly after you install the operating system to make sure they match your needs. The startup parameters enable you to

modify the Boot.ini file for a dual-boot system in order to specify which operating system to boot by default and how long to wait in seconds before starting the operating system.

The recovery parameters enable you to provide instructions about how to recover in the event of a system failure. For example, you can have the system create a log to help you locate the source of the failure after the computer reboots, and you can instruct the computer to reboot automatically upon failure. The options are as follows:

- Record the system failure as an event in the system log.
- Transmit an alert message to designated system administrators.
- Write debug information to the default file, \Winnt\Memory.dmp, or to a file you specify.
- Have the computer reboot automatically immediately after the failure.

You can configure the Startup and Recovery options from the Control Panel by double-clicking the System icon, clicking the Advanced tab, and clicking Startup and Recovery. Make the appropriate selections in the Startup and Recovery dialog box (see Figure 6-10) click OK, and then click OK again to acknowledge that you must reboot. Click OK in the System Properties dialog box and click Yes to restart the server (try Hands-on Project 6-4).

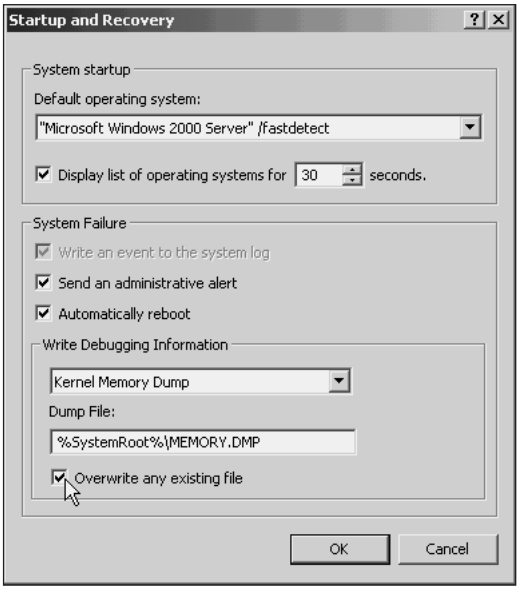

Figure 6-10 Configuring startup and recovery options

Configuring Power Management

After you have installed Windows 2000 Server, check the power management options to make sure that they are set appropriately for the computer and the way you are using the computer on the network. The default power scheme is set at Always On, which means that

it will turn the monitor off after 20 minutes, never turn off the hard disks, and never put the system in the standby mode. Also, the default setup is to run the shutdown procedure when you press the power off button, instead of placing the computer in standby mode. **Standby** is a mode in which the computer components are shut down and information in memory is cleared without automatically saving it to disk. The power supply and CPU remain active, waiting to start up all components when you press a key or move the mouse.

Configure the power options by opening Control Panel and double-clicking the Power Options icon. Access the Power Schemes tab first to establish the power settings, which include settings for desktop, laptop, and server computers. The settings change on the basis of the power scheme that you select, Portable/Laptop or Minimal Power Management, for example. In most situations, you will likely select Always On or Minimal Power Management, which are options that primarily involve display monitor power management. Another option is to create your own settings by specifying how soon to turn off the monitor, whether to turn off the hard disks, and whether to use standby mode. For example, you might set up a customized option called Server by following these steps:

1. Open the Power Options icon and access the Power Schemes tab.
2. Click the Turn off monitor list arrow and select After 1 hour.
3. Make sure that the Turn off hard disks list box displays Never.
4. Make sure that the System standby list box displays Never.
5. Click Save As, enter Server in the Save Scheme dialog box, and click OK. Click Apply and then OK to save your work (see Figure 6-11).

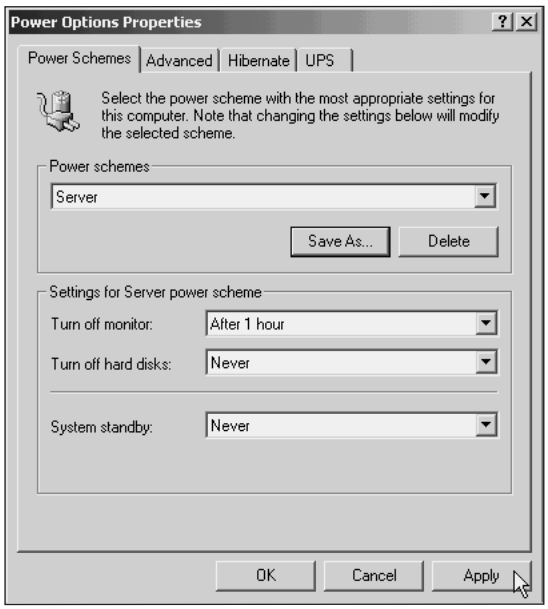

Figure 6-11 Configuring power management

Also check the Advanced tab to determine whether the computer will power off or go into standby mode, which is determined by what you enter in the "When I press the power button on my computer" box. Because you will likely be working on the computer hardware or want to perform a cold boot when you power it off, the default is set to power off. If you select standby mode, consider checking the box titled, "Prompt for password when computer goes off standby," so that only an authorized server administrator can access the server.

The third tab, Hibernate, enables you to set up the computer to hibernate when it is not in use. **Hibernate mode** is similar to standby, but with two important differences: the memory contents are saved before shutting down the disks, and it takes longer to restart all components to resume where you left off.

The fourth tab enables you to configure an uninterruptible power supply (UPS), which is a battery backup device that temporarily supplies power to the server when the main power goes out. You can set up communications between the UPS and the Windows 2000 Server through a serial connection so that the UPS notifies the server when there is a power outage and the server sends you an alert.

Configuring Protocols

The Windows 2000 Server installation steps in Chapter 5 have already illustrated how to install the default protocol configuration. However, you may need to add other protocols or to modify the existing configuration to customize the server for your network. Use the Network and Dial-up Connections folder from the Control Panel (or access the folder from the Start button Settings menu) to set up the server to communicate using other protocols, such as IPX/SPX and NetBEUI, or to configure TCP/IP. For example, you might use IPX/SPX to communicate with a particular network printer, such as an older Hewlett-Packard laser printer; or you might need to set up Windows 2000 Server to communicate as a client or gateway with a Novell NetWare server. If you are adding Windows 2000 Server to an older small network that uses only NetBEUI, then you can install this protocol as well.

Installing NWLink IPX/SPX Compatible Transport

NWLink IPX/SPX/NetBIOS Compatible Transport is installed from the Network and Dial-up Connections folder by opening the folder, double-clicking Local Area Connection, and then clicking the Properties button. Click the Install button, click Protocol, and click Add (see Figure 6-12). Select NWLink IPX/SPX/NetBIOS Compatible Transport, and click OK. As with other installations, you may need to insert the Windows 2000 Server CD-ROM, provide its path, and click to continue.

After installing the protocol, make sure that the right network number and frame type are implemented to work with the NetWare server or IPX/SPX printer to which you will connect.

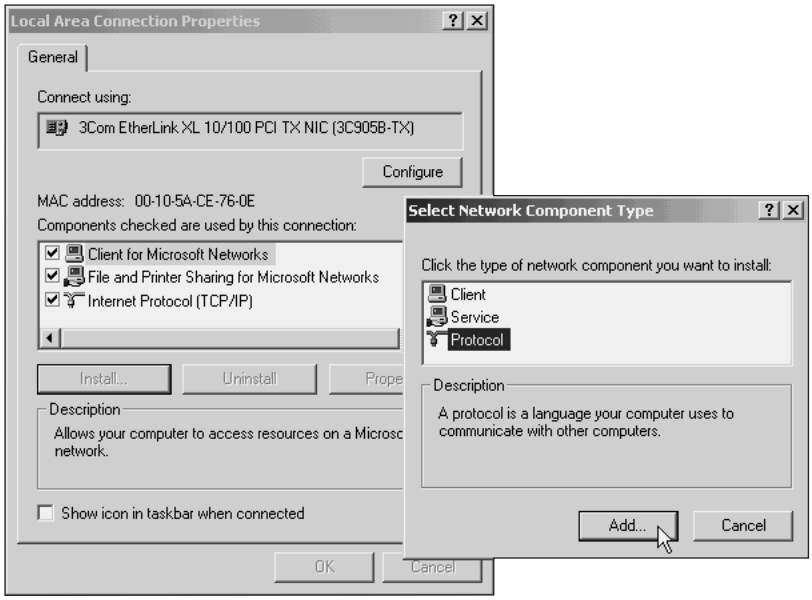

Figure 6-12 Installing a protocol

Depending on the version, NetWare may be using Ethernet frame types 802.2 or 802.3, Ethernet II, or Ethernet SNAP. The Windows 2000 server should be using the same frame type as the NetWare servers or other IPX/SPX-compatible devices already on the network. To check this information, open the Network and Dial-up Connections folder, double-click Local Area Connection, click Properties, and double-click NWLink IPX/SPX/NetBIOS Compatible Transport Protocol in the scroll box. Leave the internal network number as 00000000, if you only plan to connect to a NetWare server as a client or to connect to a printer using IPX/SPX. If you are connecting to a NetWare server to use File and Print Services for NetWare, IPX routing, or a NetWare service that uses **Service Advertising Protocol** (**SAP**), then designate an internal network number, such as 00000001 (see Chapter 3). SAP is used by NetWare clients to identify servers and the network services provided by each server. An internal network is mainly used for IPX routing to create the equivalent of a private virtual network between a NetWare server and the Windows 2000 server.

If the servers or printers to which you are connecting only use one frame type, Windows 2000 will automatically determine which frame type is in use so that you do not need to configure it. If more than one frame type is used, Windows 2000 defaults to the Ethernet 802.2 frame, and you will need to manually configure the other frame types and network number (see Chapter 3). To configure additional frame types, click the Manual frame type detection radio button and then click Add (see Figure 6-13). Select the frame type, such as Ethernet 802.3,

Ethernet II, or Ethernet SNAP, and provide the network number. Click OK to add the frame type, and repeat the process for each frame type that you need to use. Click OK in the NWLink IPX/SPX/NetBIOS Compatible Transport Protocol dialog box when you are finished. Click OK on the Local Area Connection Properties dialog box and close all remaining dialog boxes to complete the process. (Practice installing NWLink in Hands-on Project 6-5.)

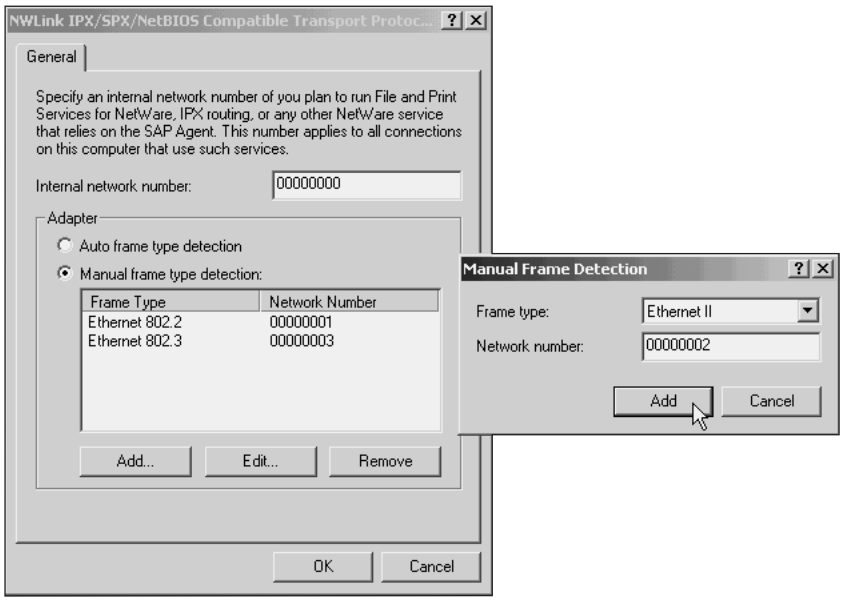

Figure 6-13 Configuring NWLink

Configuring TCP/IP

Configuring TCP/IP also is performed from the Network and Dial-up Connections folder. However, installing TCP/IP can be more complex than installing NWLink, depending on whether dynamic or static addressing is used on the network. As you learned in Chapter 3, static addressing is used on many networks, large and small, when the network administrator wants direct control over the assigned addresses. Direct control might be necessary when network management software is used to track all network nodes, and the software depends on each node having a permanent, known IP address. As you learned, an IP address uses the dotted decimal notation system of addressing, which consists of four numbers separated by periods, such as 129.77.15.182. Permanent addresses provide consistency for monitoring network statistics and for keeping historical network performance information. The disadvantage is that IP address administration can be a laborious task on a large network. Most network administrators who use static addressing have an IP database to keep track of currently assigned addresses and unused addresses to assign as new people are connected to the network.

With dynamic addressing, an IP address is leased to a particular computer for a defined period of time. This addressing method uses the Dynamic Host Configuration Protocol (DHCP), which is a standard supported by Microsoft for dynamic addressing (see Chapter 3). The protocol is used to enable a server with DHCP services to detect the presence of a new workstation and assign addressing data to that workstation.

The sample installation in Chapter 5 used the default TCP/IP setup, which employs DHCP and automatically configures the server. Some server administrators prefer to manually configure TCP/IP on each server, as a way to guarantee that the server addresses never change and so that users are never confused about how to access a server. When you use static addressing on a server, you need to determine the following information before configuring TCP/IP:

- *IP address:* The server needs a unique IP address that is compatible with your network and not assigned to any other network computer.
- *Subnet mask:* A subnet mask is a method for showing which part of the IP address is a unique identifier for the network and which part uniquely identifies the workstation (see Chapter 3). On a simple network that does not connect with many other networks, the subnet mask is likely to be 255.255.0.0 or 255.255.255.0. If you use 255.255.0.0, this means the first two sets of digits (the 255s) are the network identification for the computers on that network, and the third and fourth sets of digits (the 0s) are used as the workstation identification. For example, your network might have a network identification of 122.44. All workstations and servers on your network will have IP addresses that start with 122.44 (and usually a 0 in the third place), such as 122.44.0.1, 122.44.0.2, and so on. If your network is composed of several networks combined into one, such as on a college campus, the subnet mask might be 255.255.255.0. In this case, the 255 in the third position is used to identify each smaller network or subnetwork. On a college campus that might mean there is a subnetwork for the administration buildings (122.44.1), one for the classroom buildings (122.44.2), and another for the dorms (122.44.3). In the dorms, your IP address might be 122.44.3.20, and your neighbor across the hall might be 122.44.3.21. Your professor in a classroom building might have the address, 122.44.2.54, and the academic dean in the administration building might have 122.44.1.23.
- *Default gateway*: A **default gateway** is a computer or router that forwards a network communication from one network to another. By specifying the IP address of the default gateway, you enable the server to communicate with workstations on another network. Transmitted data goes from your server to the gateway. The gateway then routes the data to the network it is intended to reach, where it is forwarded to the destination computer.
- *Domain name service (DNS) server:* As you learned in Chapter 3, this is a network server that converts names to IP addresses. For example, if your network has a mainframe called ADMIN, that mainframe also has an IP address, such as 122.44.1.5.

When you send e-mail or some other communication to mainframe ADMIN, a DNS network server converts that name to 122.44.1.5, enabling the communication to be transferred along the network in a format that computers and network devices understand. A DNS server also can convert the IP address back to the name for the sake of human users. The DNS server on a Windows 2000 Server network is usually a DC that also has DNS services installed. Many networks have a primary DNS server and one or more alternate DNS servers as backup in case the primary server is down or busy.

If TCP/IP is not already installed, you can install it using the same steps as are used to install NWLink, described in the last section, but select TCP/IP as the protocol to install instead of NWLink. You will need to configure TCP/IP after you install it. If TCP/IP is already installed, open the Network and Dial-up Connections folder and double-click Local Area Connection. Click the Properties button and double-click Internet Protocol (TCP/IP) in the components scroll box. Click the "Use the following IP address" radio button and enter the IP address, subnet mask, default gateway, and DNS information (see Figure 6-14). (Try Hands-on Project 6-6 to practice configuring TCP/IP.)

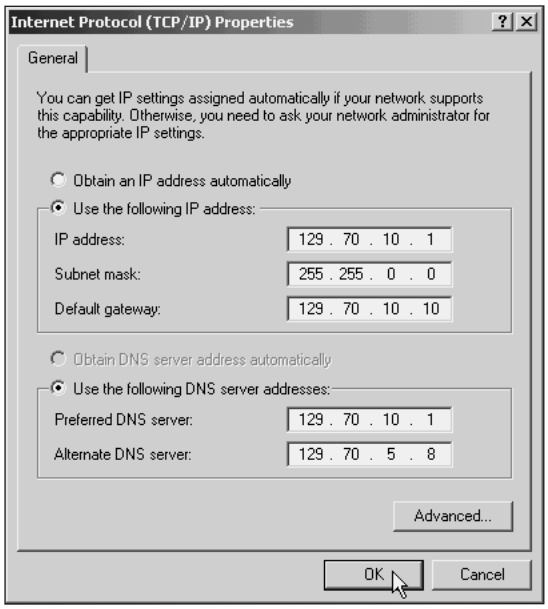

Figure 6-14 Configuring TCP/IP

The Advanced button, shown in Figure 6-14, enables you to configure additional parameters, such as the address of a WINS server and IP security (IPSec). As you learned in Chapter 3, a WINS server translates a workstation name to an IP address for communication between the Internet and Microsoft networks, and may be installed on the same network as a DNS server. When IPSec is enabled, you can specify the security policies explained in Chapter 4: Client

(Respond Only), Secure Server (Require Security), or Server (Request Security). WINS parameters are configured from the WINS tab, and IPsec is set up from the Options tab after you click the Advanced button (see Figure 6-15).

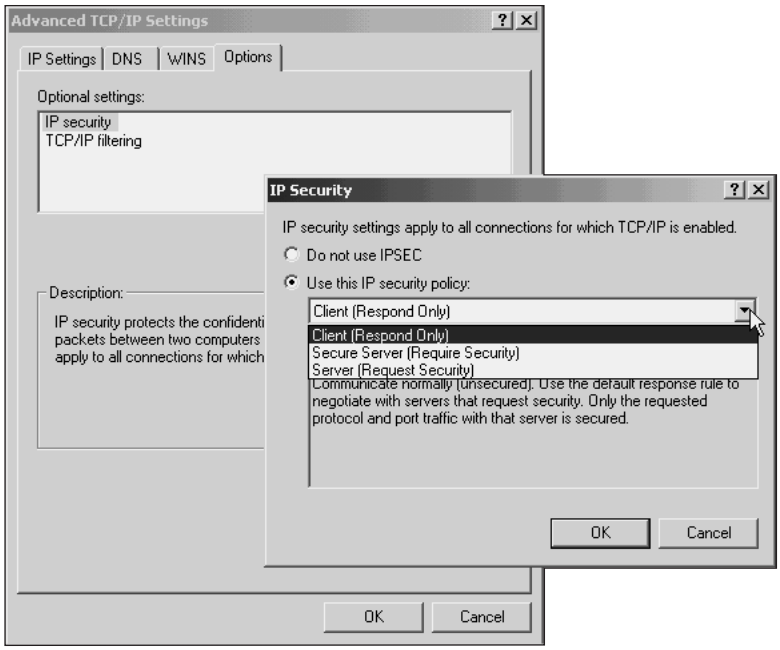

Figure 6-15 Configuring IPSec

Installing NetBEUI, DLC, and AppleTalk

NetBEUI, DLC, and AppleTalk are all installed using the Network and Dial-up Connections folder and by following the same steps that are described for installing NWLink. The main difference is that when the Select Network Protocol dialog box is displayed, select NetBEUI, DLC, or AppleTalk instead of NWLink. (Hands-on Project 6-5 provides an opportunity to practice installing NetBEUI.)

Installing Additional Windows 2000 Components

The additional components and software that you did not install initially in Windows 2000 Server can be installed in one of two places: the Network and Dial-up Connections folder and the Add/Remove Programs tool. Additional network components are installed using the Network and Dial-up Connections folder. To install one or more of these components, open the Network and Dial-up Connections folder in the Control Panel or click Start, point to Settings, and click Network and Dial-up Connections. Double-click Local Area Connection, click Properties, click Install, and double-click Service. From here you can install services such as QoS Packet Scheduler and the SAP agent.

To install Gateway (and client) services for NetWare, double-click Client instead of Service after you click the Install button in the Local Area Connection Properties dialog box.

Other Windows 2000 components, such as Internet Information Services, Networking Services, and Indexing Service (see Table 6-2) are installed using the Control Panel's Add/Remove Programs icon. After you open the Add/Remove Programs dialog box, click Add/Remove Windows Components (see Figure 6-16) to view the components that can be installed. Also, a component that is already installed but that has not been configured can be set up by clicking the Configure button that is displayed in the Add/Remove Programs window.

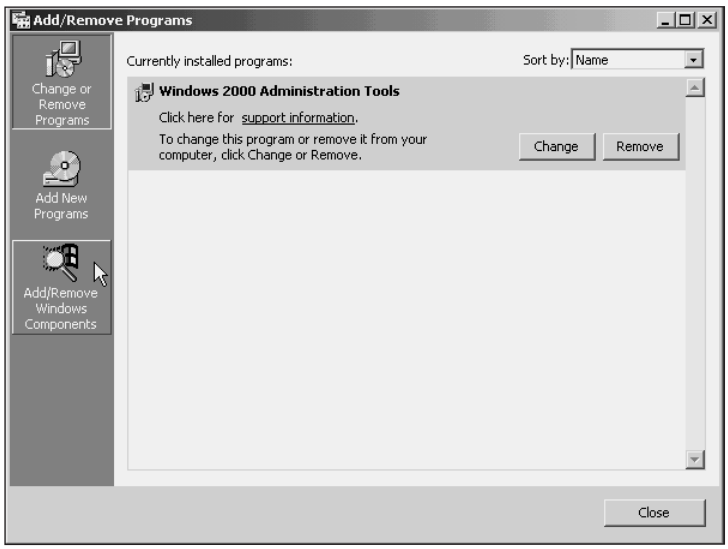

Figure 6-16 Adding and configuring components

Managing Devices and Resources

The Add/Remove Hardware Wizard is very effective in automatically setting up hardware parameters, such as resources. A server's **resources** include the **interrupt request** (**IRQ**) **line** (which is a channel for communication with the CPU) and other elements such as the **I/O address** and reserved memory range. For example, a computer contains a limited number of IRQ lines, such as 01-15. The video display, each disk drive, each serial and parallel port, and the sound card use a dedicated IRQ to communicate with the processor. Each also needs reserved memory addresses for I/O operations. Sometimes there are resource conflicts when a network adapter, a new SCSI adapter, or some other hardware is automatically configured. Besides using the Add/Remove Hardware Wizard, you can use the Device Manager to check for a resource conflict and to examine other properties associated with a device. For example, consider a situation in which there is an IRQ conflict between the NIC and another device. To check the NIC, click Start, point to Programs, point to Administrative Tools, and click Computer Management. Click System Tools in the left pane, double-click Device Manager in

the right pane, and double-click Network adapters. Right-click the specific adapter that is displayed under Network adapters and click Properties. The properties dialog box displays tabs that you can use to fine-tune a device's configuration. To check for a resource conflict, click the Resources tab and look for a conflict message in the Conflicting device list box (see Figure 6-17). If there is a conflict, the Change Setting button will be active, and you can use it to select different resources (try Hands-on Project 6-7 to check for resource conflicts).

Another way to look for resource conflicts is through the Computer Management tool: double-click System Tools, double-click System Information, and then click Hardware Resources and Conflicts/Sharing.

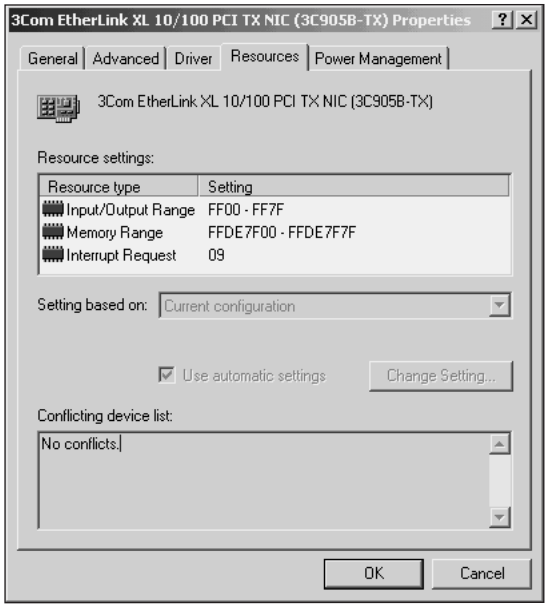

Figure 6-17 Checking for a resource conflict

You can also start Device Manager from the System icon in the Control Panel by displaying the Hardware tab.

Chapter Summary

- Windows 2000 Server can be customized in hundreds of ways to match your particular implementation. After you install the server, one of the first stops that you will make to customize the installation is the Control Panel. Using tools in the Control Panel, you can add and remove hardware and software components. The Add/Remove Hardware

Wizard, for example, uses the Windows 2000 Plug and Play capability to significantly automate the installation of SCSI adapters, NIC, hard drives, and a wide range of other hardware. Also, the Control Panel offers tools to configure the display, keyboard, pointing device, folder options, startup and recovery procedures, network services, and protocols. You will use some Control Panel tools frequently, such as the Add/Remove Hardware Wizard and the Network and Dial-up Connections tool. You may use others shortly after installing Windows 2000 Server, but use them infrequently later on, such as the keyboard and mouse configuration tools.

In the next chapter you learn about powerful storage management capabilities in Windows 2000 Server, including fault-tolerant disk configurations and the ability to back up information. You also learn how to configure an uninterruptible power supply.

KEY TERMS

date stamp — Documents, files, and other important information are permanently imprinted by a date stamp to record their creation date and time, and to record modification dates and times.

default gateway — A computer or router that forwards a network communication from one network to another, acting as a gateway between networks.

driver signing — A digital signature that Microsoft incorporates into driver and system files as a way to verify the files and to ensure that they are not inappropriately overwritten.

hibernate — A mode in which the computer components are shut down, and information in memory is automatically saved to disk before the disk is powered off. The power supply and CPU remain active, monitoring in order to startup all components when you press a key or move the mouse.

interrupt request (IRQ) line — A hardware line that a computer component, such as a disk drive or serial port, uses to communicate to the processor that it is ready to send or receive information. Intel-based computers have 16 IRQ lines, with 15 of those available for computer components to use.

I/O address — The address in memory through which data is transferred between a computer component and the processor.

OpenGL — A standard for multidimensional graphics used in Microsoft's 3-D screen savers.

resource — On a workstation or server, an IRQ, I/O address, or memory that is allocated to a computer component, such as a disk drive or communications port. On a Windows 2000 Server network, a resource is a file server, shared printer, or shared directory that can be accessed by users.

Service Advertising Protocol (SAP) — An IPX/SPX-compatible protocol that is used by NetWare clients to identify servers and the network services provided by each server.

standby — A mode in which the computer components are shut down and information in memory is cleared without automatically saving it to disk. The power supply and CPU remain active, waiting to start up all components when you press a key or move the mouse.

Review Questions

1. You are left-handed, but your mouse is set up for a right-handed person. What tool can you use to change the mouse configuration?
   a. Display tool in the Control Panel
   b. Mouse tool in the Control Panel
   c. Mouse, Keyboard, and Display snap-in for the MMC
   d. all of the above
   e. only a and b
   f. only b and c
2. For which protocol might you configure information about the default gateway?
   a. TCP/IP
   b. DLC
   c. NWLink
   d. AppleTalk
3. Your boss is concerned because some of the company's part-time night shift employees have access to the room where the server is located, and they like to play games on the server. Which option is the easiest to implement to provide more security?
   a. Remove the games.
   b. Set a time limit on the games.
   c. Create a special game account.
   d. Install a screen saver that requires a password.
4. Your Windows 2000 server needs to communicate with a NetWare server that uses IPX routing and applications that use SAP services. What protocol should you configure and how should you configure it?
   a. NWLink configured with an internal network number
   b. TCP/IP configured with an external network number
   c. NWLink configured for IP routing
   d. TCP/IP configured for WINs
5. What is the difference between the hibernate and standby modes?
   a. The BIOS setup contents are written to memory in hibernate mode, but not in standby mode.
   b. Standby mode only shuts down the monitor, whereas hibernate shuts down all server components except the NIC.
   c. The page file is moved to memory in standby mode, but not in hibernate mode.
   d. The memory contents are not written to disk in standby mode, but they are in hibernate mode.

6. When you open Windows Explorer and double-click a file that has a .log extension, you want to start Notepad to view that file. What tool enables you to associate this file type with running the Notepad application?
   a. Control Panel Display tool
   b. MMC Services tool
   c. Control Panel Folder Options tool
   d. Computer Manager Devices tool
7. You want to replace an older SCSI adapter with one that is newer. What tool enables you to uninstall the old adapter?
   a. Add/Remove Hardware Wizard
   b. SCSI Adapters tool in Control Panel
   c. Disconnect tool in Control Panel
   d. Add/Remove Windows 2000 Components Wizard
8. You are planning to update software on your company's Windows 2000 server and want to make sure that users cannot access the server temporarily. After you notify users that the server will be unavailable, how can you make sure they cannot access it while you are upgrading software?
   a. Shut down the server and reboot in MS-DOS from a floppy boot disk.
   b. Remove the network cable while the computer is still running.
   c. Put the computer in standby mode.
   d. Disable the NIC.
9. When you install NWLink, which of the following protocols and network services can it simulate?
   a. UDP
   b. SPX
   c. NetBIOS
   d. all of the above
   e. only a and b
   f. only b and c
10. When you set up TCP/IP to use DHCP, what other parameters do you need to configure manually?
   a. IP address
   b. IRQ
   c. DNS server address
   d. all of the above
   e. none of the above
   f. only a and c

11. You have set up NWLink so that your Windows 2000 server can communicate with several older NetWare 3.x and 4.x servers in your enterprise. In the process of configuring NWLink, you let it automatically determine the frame type, however now that it is set up you have problems communicating with some of the NetWare servers. What might you try?
    a. Set up DLC to communicate with the servers.
    b. Use FAT16 as the file system for the Windows 2000 server instead of NTFS.
    c. Find out if the NetWare servers and server applications communicate using more than one frame type.
    d. Make sure that none of the NetWare servers is using a network number that is over four digits.
12. Your company has primarily international clients and the customer relations group wants printed orders, invoices, and letters to show the date in date-month-year (dd-MMM-yy) format and the time in 24-hour format. Which of the following tools enables you to configure these as the defaults for your server?
    a. Control Panel Date/Time tool
    b. Control Panel Regional Options tool
    c. Control Panel Display tool
    d. all of the above
    e. only a and b
    f. only a and c
13. You notice that server response is sometimes slow when the screen saver is running and this is especially a problem when many users are accessing the server in the morning. The screen saver that you have set up is 3D Pipes. Also, you have the colors set at 256 Colors even though your monitor supports High Color (16 bit). Which of the following would you try first to fix the problem?
    a. Change to a non-OpenGL screen saver, such as Beziers.
    b. Use the High Color (16 bit) setting instead of 256 colors.
    c. Upgrade the monitor adapter to go into an ISA expansion slot instead of a PCI slot.
    d. Ask the users to distribute their workload more evenly between morning and afternoon.
14. You decide to assign a new server the same IP address that your department head is using, because she has the address 244.80.1.1 and you realize this is the best address for the server. Since it is late in the evening, you configure the server, leave it connected to the network, and plan to change your boss's address when you come to work tomorrow afternoon. What will happen when your boss logs on in the morning?
    a. She will not experience any problems.
    b. The Ethernet network will give her workstation priority over the server, because she had the IP address first.

c. She will experience a conflict with the server and may not be able to use her computer on the network.

d. Only her Internet access will be affected until the Internet negotiates a different IP address for her.

15. From where can you set up different hardware and user profiles?

a. Control Panel Folder Options tool

b. Add/Remove Hardware Wizard

c. Control Panel Multimedia tool

d. Control Panel System tool

16. You plan to use certificates and need to install the Certificate Services. Which tool do you use?

a. Add/Remove Windows Components option in the Add/Remove Programs tool

b. Change or Remove Programs option in the Add/Remove Programs tool

c. Configure Windows Components option in the Add/Remove Hardware Wizard

d. Change or Remove Programs option in the Folders tool

17. Your college campus has just decided to enable Macintosh computers to access your Windows 2000 servers. How can this be accomplished?

a. Use the Network and Dial-up Connections tool to install NWLink with the AppleTalk extension.

b. Use the Network and Dial-up Connections tool to install AppleTalk.

c. Use the Add/Remove Programs tool to install TCP/IP with the AppleTalk extension.

d. Windows 2000 Server does not support AppleTalk; thus, you cannot provide this service.

18. Your server did not originally come with a modem, but after you install Windows 2000 you decide to purchase and install a modem. Which of the following tools enable you to install the modem?

a. Add/Remove Hardware Wizard

b. Control Panel Phone and Modem Options tool

c. Control Panel Accessibility Options tool

d. all of the above

e. none of the above because you must use the Computer Management tool

f. only a and b

19. When you set up a scheduled task, which of the following does that tool work with to run the task?

a. DNS client service

b. COM+

c. AT command

d. all of the above

e. none of the above

f. only b and c

20. As you run a new server, you notice that the monitor sometimes seems to lock up and that this happens when the LED on the new NIC that you installed shows that the NIC is particularly active. What might be the problem?

a. You do not have enough server memory.

b. There is EMI interference between the NIC and the monitor.

c. The NIC needs to be reseated in its expansion slot.

d. There is a resource-sharing problem between the NIC and the monitor.

21. Your server is about two weeks old and has Windows 2000 Server installed; you are now experiencing problems with the floppy disk drive because there are times when it does not seem to communicate with the server. Which tool can help you test the floppy drive controller?

a. Control Panel Controllers tool

b. Add/Remove Hardware Wizard

c. Network and Dial-up Connections Wizard

d. all of the above

e. none of the above

f. only a and b

22. From where can you start the Device Manager?

a. Control Panel System tool

b. Event Viewer on the Administrative Tools menu

c. Computer Management tool

d. all of the above

e. only a and b

f. only a and c

23. Which of the following is not a Windows 2000 component that you can install?

a. Indexing Service

b. Script Debugger

c. Remote Installation Services

d. File and Print Services for IBM MVS

24. One of the new server operators in your organization has a hearing disability and needs to have visual warnings and captions set up. How can you configure the Windows 2000 servers for these visual displays?

a. Control Panel Accessibility tool using the Sound tab

b. Control Panel Accessibility tool using the Display tab

c. Control Panel Display tool using the Appearance tab

d. Control Panel Display tool using the Settings tab

25. Your Windows 2000 Server installation is two days old when the system crashes before you can configure the recovery options. Where might you find information to help you or a Microsoft technician diagnose the source of the crash?
    a. in the Applications log
    b. in the Memory.dmp file
    c. in the file \Winnt\System32\Crash.log
    d. in the Device Manager

HANDS-ON PROJECTS

Project 6-1

In this project, you practice configuring the display to use a different pixel setting. For this and the projects that follow, you will need to log on as Administrator or from an account that has Administrator privileges.

To use a different pixel setting:

1. Click **Start**, point to **Settings**, and click **Control Panel**.
2. Double-click the **Display** icon and then click the **Settings** tab.
3. Point the Screen area sliding bar to a different selection. For example, if it is at 640 by 480 pixels, move it to 800 by 600 pixels.
4. Click **Apply** and then click **OK**.
5. When the display changes, notice the new appearance and then click **No** so the change is not made permanent.
6. Record your observations of the display change in a lab journal or word-processed document.
7. While you are in the Settings tab, click **Advanced**. Record the options available to you from the Advanced button and then click **Cancel**.
8. Click **Cancel** to leave the Display Properties dialog box.

Project 6-2

In this activity you practice uninstalling a NIC.

To uninstall the NIC:

1. Click **Start**, point to **Settings**, and then click **Network and Dial-up Connections**.
2. Double-click **Local Area Connection**.
3. Click **Disable** and then close the Network and Dial-up Connections dialog box.
4. Click **Start**, point to **Settings**, and then click **Control Panel**.
5. Double-click the **Add/Remove Hardware** icon and then click **Next**.

6. Click **Uninstall/Unplug a device** (see Figure 6-2) and then click **Next**.
7. Click **Uninstall a device** and then click **Next**.
8. Locate the NIC, such as **3COM EtherLink Xl 10/100 PCI TX NIC** in the Devices box and notice that it has a red "X" through it because you already disconnected it in Step 3. Where is the NIC displayed in the Devices box?
9. Click the NIC so that it is highlighted and then click **Next**.
10. Click **Cancel** in the confirmation dialog box so that you do not really uninstall the NIC.
11. At this point, how can you go back and reconnect the NIC to the network?
12. Record your observations in a lab journal or word-processed document.

Project 6-3

In this hands-on activity you troubleshoot a device, using the Add/Remove Hardware Wizard.

To troubleshoot the device:

1. Click **Start**, point to **Settings**, and then click **Control Panel**.
2. Double-click **Add/Remove Hardware**. Click **Next**.
3. Click the **Add/Troubleshoot a device** radio button. Click **Next**.
4. Wait a moment as the wizard checks for new hardware.
5. Use the scroll bar to view the devices that can be tested and note the types of devices in your lab journal or in a word-processed document.
6. Double-click a device to troubleshoot, such as **Printer Port** (**LPT1**).
7. Record the results and then click **Back**.
8. Double-click another device to test, such as the NIC or floppy disk drive.
9. Record the results of this test and then click **Finish** to close the wizard.

Project 6-4

In this hands-on activity, you set up Windows 2000 so that it does not start up automatically after there is a system failure.

To configure startup:

1. Click **Start**, point to **Settings**, and then click **Control Panel**.
2. Double-click the **System** icon and then click the **Advanced** tab.
3. Notice the buttons on this tab and record your observations in a lab journal or word-processed document.
4. Click the **Startup and Recovery** button.
5. At the bottom of the Startup and Recovery dialog box, remove the check in front of **Automatically reboot**, or check it if there is no check.

6. Review the other options on this screen and record your observations.
7. Click **OK** in the Startup and Recovery dialog box and then click **OK** to acknowledge that you have to reboot.
8. Briefly look at each tab on the System Properties dialog box and note your observations. What is each tab for? Click **OK** in the System Properties dialog box, and click **Yes** to reboot (save any open work first). Make a note that this activity results in the need to reboot.

Project 6-5

In this activity you practice installing NWLink or NetBEUI (whichever protocol is not already installed in your computer running Windows 2000).

To practice the installation:

1. Click **Start**, point to **Settings**, and then click **Network and Dial-up Connections**.
2. Double-click **Local Area Connection** and then click **Properties**.
3. Click the **Install** button and then double-click **Protocol**.
4. What protocols do you see listed? Are these only protocols that are not already installed? Record your observations.
5. Click **NWLink IPX/SPX/NetBIOS Compatible Transport** or **NetBEUI**, and then click **OK**.
6. If you install NWLink, go back to the section "Installing NWLink IPX/SPX Compatible Transport" and follow the steps described there to configure NWLink after Windows 2000 reboots.
7. Close the Local Area Connection Properties dialog box. Close the Local Area Connection dialog box, and then close the Network and Dial-up Connections tool.

Project 6-6

In this activity you practice configuring TCP/IP. Before you start, obtain an IP address, subnet mask, gateway address, and primary DNS server address from your instructor. Also, TCP/IP must be installed before you begin. If it is not installed, use the steps outlined in the last project to install TCP/IP.

To practice the installation:

1. Click **Start**, point to **Settings**, and click **Network and Dial-up Connections**.
2. Double-click **Local Area Connection** and then click **Properties**.
3. Find **Internet Protocol** (**TCP/IP**) in the scroll box and double-click it.
4. Click **Use the following IP address:**.
5. Enter the IP address, subnet mask, default gateway address, and preferred DNS server address provided by your instructor. Note that within each entry box, you move from number to number by pressing the period key. For example, to enter the IP address, 129.70.10.1, you would type**: 129 [period key] 70 [period key] 10 [period key] 1**.

6. After you have entered the information, click the **Advanced** button and examine each tab. What are the tabs and what information do they enable you to configure? Record your findings in your lab journal or a word-processed document, and then click **Cancel**.
7. Click **OK** if you have permission to save your configuration changes or click **Cancel** so the changes are not saved.
8. Click **OK** in the Local Area Connection Properties dialog box. Click **Close**. Finally, close the Network and Dial-up Connections window.

Project 6-7

Sometimes a resource conflict is subtle, such as a NIC locking up intermittently because it uses a portion of an I/O address range that is also used by another device. In this project, you learn how to check for a resource conflict.

To check for a resource conflict:

1. Click **Start**, point to **Programs**, point to **Administrative Tools**, click **Computer Management**, and then double-click **System Tools**.
2. Double-click **Device Manager** and then double-click **Network adapters**.
3. Right-click the adapter installed in your computer and then click **Properties**.
4. What tabs appear in the properties dialog box? Check out each tab to see what it is for.
5. Select the **Resources** tab. What resource settings are used for the NIC?
6. Are there any resource conflicts reported? How would you solve a resource conflict?
7. Record your findings in your lab journal or a word-processed document.
8. Click **Cancel** on the NIC properties dialog box.
9. Before you exit Device Manager, find out what resources are used by another device, such as a communications port or the display adapter.
10. Close the Computer Management tool.

CASE PROJECT

Aspen Consulting Project: Configuring Windows 2000

Health-Wise is a company that makes vitamin supplements sold in grocery and drug stores. This company has a network that connects users to a mainframe computer and to eight older NetWare servers configured to use IPX. The company has an Internet site and already uses TCP/IP for connectivity to the mainframe. DHCP is not used on this network, and there is a network administrator, who keeps a database of IP addresses. The company has purchased a new client/server manufacturing and distribution system that will run on two Windows 2000 servers. Since they have no Windows 2000 experts, they are using Aspen

Consulting to install and configure the new servers. You have just installed the servers and now need to configure them.

1. When you installed Windows 2000 Server, you used DHCP as the default, and now you need to go back and manually configure both servers for TCP/IP. Explain how to configure the protocol, including the tool that you would use to configure it.
2. IPX is not set up as a protocol in the Windows 2000 servers, and you need to set it up so that both servers can communicate with the NetWare servers, which use the Ethernet II and Ethernet SNAP frame types. Explain how you would set up the Windows 2000 servers to be able to communicate with the NetWare servers.
3. As you are configuring protocols, you discover that the NIC on one of the servers is not communicating with the network. What steps can you take to troubleshoot the NIC?
4. Health-Wise is planning to connect one of the new Windows 2000 servers to the Internet by installing an ISDN adapter in an expansion slot. Explain in general how you would install the adapter in Windows 2000 Server.
5. During the Windows 2000 Server installations you omitted installing the Management and Monitoring tools. Explain how you can install them now on both servers.
6. The IT director for Health-Wise asks you to set up a screen saver on each server and to create an immediate way to protect the servers so that people nearby do not access them, in case she forgets to log off the Administrator account when she steps away from the servers. How would you accomplish these tasks?

Optional Case Projects for Teams

Team Case One

Mark Arnez has hired several new and inexperienced consultants. To help orient the new consultants, he asks you to form a team and write a set of general guidelines for installing and configuring protocols in Windows 2000 Server.

Team Case Two

While you are in the break room, you get into a discussion with a group of other consultants about accessibility options for computers. As a group you decide to research the accessibility options in Windows 2000 Server. What are the options? What additional options would your group add to Windows 2000?